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THE UNITED STATES VERSUS THE THIRD WORLD SUBMARINE: ARE WE READY?

By

Clinton H. Cragg

LCDR, United States Navy

A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Operations.

The content of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.

Signature Clinton H. Cragg

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Paper directed by Colonel T.L. Gatchel, USMC
Chairman, Operations Department

Approved by:

Captain G. Stewart,USN

Abstract of

THE UNITED STATES VERSUS THE THIRD WORLD SUBMARINE: ARE WE READY?

The United States faces a serious problem with proliferation of highly capable state of the art submarines and submarine technology. The Maritime Strategy, developed primarily to advance the interests of the United States vis-a-vis the Soviet Union, is flexible enough to allow the Third World submarine challenge to be discounted. The United States needs to recognize that a problem exists and take action to diminish the threat. This study examines historical submarine usage and the capabilities of new generation diesel-electric submarines to provide the reader with an appreciation for the types of situations that may present themselves in the future. With a rapid spread of submarines throughout the world, the United States will soon be involved in some type of crisis that requires a significant Anti-Submarine Warfare force. Unfortunately, the USN is not ready to fight in such a conflict. The Maritime Strategy needs to address this new threat. Submarine technology proliferation needs to stop. The USN needs to train, and train hard, for the certain eventuality that confronts us.

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CHAPTER I

INTRODUCTION

Throughout the world, the proliferation and use of highly sophisticated and capable Diesel-Electric submarines has risen dramatically. In the last two decades, several countries not only sold these new submarines to client states but also, in some cases, assisted these countries in creating an indigenous submarine construction capability. Now, some of these new submarine building nations are offering their state of the art ships for sale. Other countries are settling for a modernization program that promises to vastly expand the capabilities of their submarine fleet.

The growth in the number of countries with submarines has been extraordinary. In 1950, 19 countries could say that a submarine arm was a part of their navies.[1] By 1988, 43 countries could claim this distinction.[2] A number of these submarines are, of course, old and of dubious value, but an ever increasing number represent the latest in technological improvements. No where else can this trend be better seen than in the international arms market.

The value of arms sales worldwide decreased 20% in the period from 1986-1989 as compared to 1982-1985.[3] Arms deliveries (armored vehicles, combat aircraft, naval surface ships, missiles, and the like) fell by a rough estimate of 30-60% for the same period.[4] The only major category to defy

this downward trend was the submarine, sales of which actually rose by 30%.[5] One has only to glance through any of the innumerable defense related periodicals to see the expensive and eye catching advertisements that offer submarines and submarine technology for sale. The market is indeed there and at present, very active.

The United States needs to carefully evaluate the consequences of the rapid and potentially deadly proliferation of what Admiral Bruce DeMars aptly described as the "first true stealth platform."[6] How will a hostile Third World nation, with as little as three or four of these new or modernized submarines, utilize their power to hinder or in the worst case, thwart U.S. interests abroad? When a regional war or other crisis involving submarines develops, the United States, which is not now wholly prepared, needs to be ready. This paper will examine the submarine proliferation issue and provide recommendations for future U.S. foreign and military policy. "Third World Navies make it almost inevitable that the submarine warfare will be a feature of future regional conflicts. It is a depressing prospect for all but the suppliers of submarines and their weaponry."[7]

CHAPTER II

SUBMARINE USE DURING THE 20TH CENTURY

During the two World Wars this century, submarines played an important role. Both wars saw submarines bring Germany close to victory. In World War II, U.S. submarines destroyed the Japanese high seas logistic network. The incredible effort required to combat the German challenge is well known. But besides the two World Wars, submarines have been used fairly often. This chapter will not present a "history" of Submarine Warfare but rather introduce examples of submarine use that will illustrate it's broad capabilities and may give the United States a glimpse of what is likely to occur in the future.

Submarine Use In A Civil War

During the Spanish Civil War, between 1936 and 1937, "unidentified" submarines attacked merchantmen in and around the coastal waters of Spain, the Western Mediterranean, and as far away as the Aegean Sea. Three Russian and about 35 other vessels from England, Greece, Denmark, and other neutrals were sunk.[8] It was widely believed at the time to be the handiwork of Benito Mussolini who had given two submarines to Spain. Whether the submarines were crewed by Italians, Spanish, or a mixture of both is unknown. England, the greatest naval power at the time, was slow to react (more

than one year) and as a consequence, precious supplies to the Spanish Republican Government decreased dramatically.

Submarine Commander Set State Policy

A Polish submarine Captain, during World War II, was told prior to firing on an Italian merchantman, that Poland was not at war with Italy. His purported reply was,"I, Boris, declare war on Italy. Fire one."[9] The merchant ship sank. This type of spirit/attitude may yet exist today in some navies.

Surveillance/Commando Operations

During the Korean War, American submarines, freed from having to fight against a formidable navy, conducted many surveillance operations against North Korea and occupied South Korea. On occasion, they landed commando troops who took part in disrupting enemy communications and supply lines. During the Falkland's War, the Argentine submarine, Sante Fe, landed commandos near Port Stanley to assist in the capture of the disputed islands.

Regional Conflicts

During the early seventies, Pakistan and India were locked in a bloody war. Although little information is available, it is apparent that in 1971 a Pakistani submarine engaged and sank an Indian Frigate.[10] As regional conflicts continue to occur, it may be assumed that this type of action will happen again.

Submarines As Terrorist A Platform

Because of its ability to provide hidden blows, the

submarine can be used as a weapon of terror. The following example from the early seventies illustrates a different view of state sponsored terrorism. On July 17, 1974, President Anwar el-Sadat revealed in an interview that an Egyptian submarine had put to sea in 1973 for the express purpose of torpedoeing the luxury liner, Queen Elizabeth 2. The liner, at the time was carrying 620 Jews, most of them American, to Haifa to celebrate Israel's 25th anniversary.[11] According to Sadat, "One of the Arab leaders had the idea to torpedo the Queen Elizabeth. Unfortunately, he tried to use one of my submarines, and he issued the order. And the captain of the submarine went out to sea to intercept the Queen Elizabeth."[12] At the time the union of Egypt and Libya was being strongly promoted by Libya's leader, Muammar el-Qaddafi, so it is widely believed that Qaddafi issued the order. Sadat ordered the submarine to return to port when he heard about the incident. In an era of state sponsored terrorism, the submarine could be an effective weapon.

The Falkland's War

Many lessons arise from the Falkland's War, where a large modern navy fought a much smaller, less sophisticated force. England cleared the seas of Argentine surface vessels, when a Royal Navy nuclear submarine sank the Belgrano. Meanwhile a lone Argentine Type 209 submarine was able to cause great concern to the British forces. This submarine, the San Luis, conducted attacks on two British surface vessels and possibly against a British nuclear submarine.

None of the attacks were successful, but the havoc this ship created was extraordinary. More than 200 Anti-Submarine Warfare (ASW) ordinance devices were expended by one of NATO's leading ASW powers. None found their mark. Fortunately for the British, the Argentine submarine force was operating at a three fold disadvantage:

1) The Argentine Navy, including the submarine command, was not told to prepare for the war until well into 1982.[14] Many of their experienced submariners were in Europe, preparing for the delivery of a modern TR-1700 class submarine. Argentina's other 209 submarine, the Salto, was undergoing major yard work. As a consequence, the San Luis became the only real threat to the British.

2) The crew of the San Luis, only recently assembled, was inexperienced and not well trained. Argentine torpedo attacks were unsuccessful reportedly because of fire control computer casualties and torpedo wire guidance failures. Additionally, the Argentine Commanding Officer fired his torpedoes from too deep, against the express instructions from the head of the German U-Boat arm.[15] These factors point to a ship that was operationally unready to fight a war.

3) Long before the war, the Argentine Admirals had decided to increase the number of modern submarines in their fleet from two to eight.[16] Their stated aim at the time was to utilize these ships for sea control and sea denial in the South Atlantic. The British were lucky to contend with only one.

CHAPTER III

SUBMARINES- THE VIEW FROM THE THIRD WORLD

Henri Cazaban, Head of the Direction des Constructions Navales (Directorate for Naval Shipbuilding of the French Ministry of Defense), when asked why developing countries wanted submarines replied, "the submarine has long been considered to be the arm of the weak against the strong..."[17] To state it another way, many nations saw the role that this platform played in the Falkland's War, and they feel that proper defense, against even a superpower, is best served by a force multiplier, the submarine.

Argentina's reaction to the results of the war, speak not only for themselves, but for many Third World countries. Following the war, Argentina realized the need to find a counter to the nuclear submarine threat. The submarine, viewed as a luxury item in the seventies, was now considered as an essential element in Argentina's security. The submarine arm of the Argentine Navy, once a minor element, was raised to equal status with the naval air and surface forces. The submarine came to be viewed as a cost effective avenue to carry out the mission of the state. Surface vessels were considered to be more and more vulnerable to a variety of threats including submarines, aircraft, and missiles. The final and most persuasive indicator that the Argentines now mean business about the submarine, can be seen in light of

the economic situation in the country following the war. After the transition to a democratic government, the country experienced a sever economic crisis which was accompanied by what some have called hyper-inflation. During this period, the defense budget was cut in all areas except the TR-1700 building program.

Brazil and India have expressed similar views concerning submarines. Brazilian Naval authorities have publicly stated that their growing force will be used not only for sea denial, but also to carry a war to their enemies door step.[18] India's approach to submarines has centered around an aggressive foreign policy that is striving to make India the main regional power. The presence of the U.S. Seventh Fleet in the Bay of Bengal during the 1971 war with Pakistan is often cited by Indian diplomats as one reason for their aggressive buildup.*

Similar attitudes are expressed worldwide. Another persuasive argument to acquire submarines is rationalized by regional arms races. If your hated neighbor obtains submarines then it is logical to assume that they may be used against you.

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* It is even reported that Indian intervention into Sri Lanka was conducted to prevent the U.S.Navy from establishing a base there.[20]

CHAPTER IV

SUBMARINE PROLIFERATION

The proliferation of new, highly capable submarines and submarine technology has increased sharply in the past two decades. Although exact figures differ, some feel that there are over 500 diesel-electric submarines in service today (See Appendix I).[19] The major exporters of submarines have been the Soviet Union, France, and Germany. Other countries who have sold submarines are Italy, Britain, Sweden, and the Netherlands. Countries that have begun or are beginning the local construction of submarines include Argentina, Australia, Brazil, China, India, Japan, North Korea, South Korea, Spain, Turkey, and Taiwan. Other countries, such as South Africa, have expressed a desire to begin construction programs in the future. The rapid proliferation of submarines from the original Western and Communist countries will almost certainly get worse when some of the above countries begin exporting. Argentina has already announced its willingness to do so.

Germany, by far the largest Western exporter of sophisticated submarines, offers a "cradle to grave" service.[21] They will instruct the crews, provide support in

operating, maintaining, and modernizing the submarines, and even teach their clients how to build the ships for themselves. A typical German agreement would read like this:

Contract between Howaldtswerke (HDW) of Kiel and the Government of India

a. Two `209' class (Type 1500) submarines were to be built in Kiel for India.
b. `Packages' for two more were to be supplied to Mazagon Yard, Bombay.
c. Howaldtswerke were to train groups of specialists to supervise the construction of the submarines in (b) above.
d. Howaldtswerke were to supply logistic services during trials and early periods of all the submarines' commissions and provide consultive services in Bombay.[22]

Lifetime service is also available for those countries that request.

German companies have a strong selling point in their history. Thyssen Nordseewerke (TNSW), although smaller than HDW, can present a long record of high quality service and satisfied customers. Founded in 1903, the company started building submarines in World War II. Since then they have built 60 submarines for a variety of clients (including their own navy) and can proudly boast of a highly skilled submarine work and design force that has an average of 20 years of employment.[23] Since the 1960's, German companies have sold 73 submarines to 14 different navies.[24]

France is the second major western supplier. France, though behind Germany in sales, has conducted an aggressive campaign to sell submarines. A Third World Periodical, the Asian Defense Journal, succinctly describes the developing

nation's view of France: "It is worth noting that the French Government, *to its credit*, has taken a more liberal approach to the vexed question of technological transfer than many other Western Governments."[25] France advertises that the same technology that is used in their conventional submarines was developed and is utilized in their SSBN program.

France routinely sends its modern diesel-electric submarines on tour to allow developing nations to see first hand. The French sales pitch starts with the line, "Any navy worthy of the name....has the maturity necessary for submarine operation."[26] The French approach is somewhat different from the German. France will supply an older submarine to a country that is new to submarining, while the new submarines are being built. The buying country's submarine force can thus quickly begin gaining operational experience. As in some German contracts. countries that wish to start building their own submarines ordinarily must have the first two ships built in France.

The Soviet Union has been the major exporter over the years but that is changing. Many of the world's countries own and operate older generation Soviet designs. These designs include the popular Romeo and Foxtrot classes. Highly capable new generation submarines. such as the Kilo class. are being exported to only a select few. India being one recipient.

From the list of countries in Appendix I. many observations can be made. As discussed before. many of the

submarine purchases/developments are regional rivalry related (i.e. India/Pakistan, North Korea/South Korea, Argentina/Brazil, etc.). More alarming, however, is the potential political instability that many of these countries exhibit (Chile, Argentina, Pakistan, Libya, etc.). Political instability, or the threat thereof, is not a deterrent to the submarine salesman. One item of note is that the Shah of Iran had ordered submarines for his navy. Had they been completed and delivered on time, Operation Earnest Will that reflagged Kuwaiti tankers, might have had a different outcome.

CHAPTER V

ROLES AND CAPABILITIES OF THE MODERN CONVENTIONAL SUBMARINE

In the U.S. Navy, it is the opinion of some that the roles and capabilities of the modern conventional submarine are as severely limited today as they were 30 years ago. The adage that the diesel-electric submarine has been outdated, out classed and out gunned by its nuclear counterpart is a total fallacy.

In 1984, the Argentine Navy took delivery of a West German built TR-1700. No recent warship delivery to a Third World nation, has caused quite the stir in international circles that this one did. Following the Falkland's War so closely, England and other Western nations (and probably Communist countries as well) were extremely interested in the

new ship's capabilities and characteristics. Numerous overt (and possibly covert) attempts were made to gather intelligence on this third generation submarine while it was on sea trials and in transit to Argentina. The capabilities of the TR-1700 are impressive.

The ship is able to run at 25 kts submerged for 1 1/2 hours.[27] It can remain on patrol, submerged for as long as 70 days (Snorkeling being done submerged but shallow enough to raise an air induction mast). The indiscretion rate (the time spent snorkeling to recharge batteries compared to total patrol time) is believed to be less than 10-20%.[28] Six bow mounted 21 inch torpedo tubes allow for the use of the heaviest of torpedoes and its 16 reloads ensure it will be well stocked for a patrol.[29] In combat, reloads can be conducted automatically in 50 seconds.[30] Up to date fire control, Electronic Support Measures (ESM), and sonar systems only add to its capabilities. Finally, its 12,000 nm range and 890 foot maximum depth make the TR-1700 a formidable ocean going threat.[31]

The new generation French submarines are also very impressive. They have made significant progress in all areas of submarine warfare. It is useful to examine the French design objectives for their submarines. In order of priority, they are:

a. Presence at sea
b. To ensure maximum survivability both in transit and on patrol
c. To ensure maximum efficiency for the whole life of the boat
d. To ensure that the submarine is capable of mounting

a decisive attack and, just as important, being able to survive the most determined attack

e. That the submarine is designed as to require the minimum number of personnel to operate it[32]

These objectives seem to describe the TR-1700 exactly.

We have already alluded to some of the missions and uses of the conventional submarine in Chapter II. Classic roles for the diesel-electric submarines include special warfare, mine warfare, anti-surface warfare, and anti-submarine warfare. One of the last American conventional submarine commanding Officers, in testimony before Congress in 1980, stated that "...the non-nuclear submarine can serve extremely efficiently in coastal anti-submarine and sea control assignments in restricted waters..."[33] The barrier patrol in or near a choke point (such as a strait) and the operation in relatively shallow water has been the Hallmark of the conventional submarine since advent of the nuclear submarine. The added capabilities of the new diesels, make these areas even more unsafe and the high seas open to invitation.

In the past, Third World submariners have been regarded as unprofessional and not effective. Egypt, for example, ruined several submarines, given to them by the Soviets, by utilizing improper maintenance practices. Today, all that is changing. For one, the size of the crews are getting smaller. A 1950's generation American Tang class required a crew of 82 while the new TR-1700 needs only 26.[34] As any submariner will tell you, their business requires the utmost concentration and 100% performance from the entire crew for the ship to

operate properly and to carry out its mission. By minimizing the crew, less training is required and less room is allotted for personal error. Additionally, today with the progress made in computer and other technologies, crews can be trained using advanced land based simulators to gain the experience that in days past, could only be obtained at sea. The French utilize these type of simulators to train their client's crews.

The speed and depth limits of the modern conventional submarine are impressive. Advances in battery technology allow these new submarines to transit at high speeds for longer and longer periods. In 1980, a German designed submarine was reported to Congress as being able to run at 14 kts in excess of 8 hours.[35] Jane's Fighting Ships gives figures that indicate that the Tr-1700 can remain submerged in excess of three days at 6 kts. The maximum operating depths of the newer submarines approach those of its nuclear cousin. It should be noted that the pressures at these depths are enormous. The pressure at the TR-1700's maximum depth (890ft) is nearly 400 lbs/in^2.

In the weapons area, heavy weight 21 inch torpedoes are available that streak through the water at 55 kts.[36] The TR-1700's impressive 16 weapon reload capability and its six bow mounted torpedo tubes make it a threat to be dealt with. Most present day torpedoes feature wire guidance, advanced active/passive acoustic homing, quiet propulsion, and large (250kg) warheads.[37] Many countries are acquiring a submerged

launched cruise missile capability. Pakistan and Israel already have the U.S. made Harpoon while Egypt should get the system in 1993. The French have a variant of their famous Exocet missile that can be launched from a submerged submarine.

The area of electronics has been active. ESM systems are in place that are designed to alert a snorkeling submarine to an airborne or surface threat. Towed sonar arrays can allow conventional submarines to monitor the acoustic environment thus maintaining important detection capability even while snorkeling. The TR-1700 fire control system, Signaal Sinbads, can handle five targets and three torpedoes simultaneously(a critical asset in a multiple target/threat environment).[38] In the important area of navigation, submarines are being fitted out with inertial navigation systems. These devices can significantly extend the time between a submarine needs to obtain an external fix of the ships position.

In the field of propulsion the most significant advances are yet to come. The speed and battery endurance factors have been discussed, but consider a conventional submarine that could operate for weeks without ever having to snorkel. The type of engineering that makes this all possible is routinely called Air Independent Propulsion (AIP). As of this writing, Sweden and Germany have each had an operational AIP system for almost two years. There are four major systems in the Western world that could soon be in wide use. They are: -a closed cycle diesel engine, -the Stirling engine, -fuel

cells, -a small low power nuclear reactor. In each case the AIP system provides the generation of small amounts of electrical power. The submarine, by operating at low speeds (4-6kts), can maintain their batteries topped off. The indiscretion rate would therefore erode even further and the key time that most believe diesel-electric submarine kills would occur(i.e. while snorkeling) will evaporate. Australia, who is presently building submarines of a Swedish design, is close to deciding whether it will opt for the Stirling engine. If it does, it will make the first country to receive the exported AIP technology.

As shown, the new and future generations of diesel-electric submarines have an impressive array of attributes. No longer can they be dismissed as just an "intelligent mine," lurking in one spot awaiting a target. Indiscretion rates, already very low will become even lower in the future. With a complex electronics package, a lethal weapon loadout, and an unrestricted mobility, these submarines will present a significant challenge to all who oppose them.

CHAPTER VI

UNITED STATES MARITIME STRATEGY

The United States is an island nation that depends heavily on overseas trade, mutual support of our allies, and

freedom of the seas. Approximately 99% of our overseas exports and imports and over 70% of our total trade value, enter and leave this country by sea.[39] The Maritime strategy was designed to help support these interests.

The strategy is more of a concept than a war plan. It depends on three broad principles that can be described as deterrence, forward defense, and dependence on a variety of alliances and agreements. Deterrence depends not only on our strategic nuclear forces but also on a conventional crisis response capability. Forward defense allows our naval forces, usually already in theater, to respond quickly to a crisis. This is obviously necessary as most of our trading partners and allies are located on or near the Eurasian landmass. Finally the strategy depends on a network of alliances with more than 40 countries to provide for mutual security.

Is this a viable strategy? Some detractors feel that the strategy is too global, that is, it is too heavily oriented towards preparing for the big war with the Soviet Union. They feel that the strategy relegates low intensity and Third World conflicts to a less than secondary position because of their peripheral strategic importance. Admiral Trost,the outgoing Chief on Naval Operations(CNO), in a 1990 article on the subject, addressed just these concerns. The Admiral wrote that "Planning for regional and low intensity conflicts highlights a broadening of the national strategic focus in the past few years."[40] But because of the long lead time required for the development and construction of naval

ships, these conflicts will be a "come as you are" type affair. He correctly states that:

> "The most worrisome aspect of the increasing diffusion of global political and military power is the accompanying spread of high-technology weaponry. The availability of the most modern weapons and growth of indigenous arms industries add a new dimension to the security calculations of these regional powers, and our own as well.... With or without superpower involvement, low intensity conflicts will be increasingly violent and involve high technology. The proliferation of sophisticated weapons worldwide means that the types of naval forces designed to prevail in the most technically sophisticated and modern threat environment, exemplified by Soviet capabilities, are increasingly the same types of naval forces required to fight anyone else."[41]

This is a clear understanding of the problems that the United States faces, especially with regard to Third World submarines. But is this the current thinking everywhere in the U.S. Navy?

Review a question asked of Vice Admiral Daniel L. Cooper, Assistant Chief of Naval Operations for Undersea Warfare:

> Q."Navy officials have told Congress that there now are 41 countries that have more than 400 diesel submarines, and a good many countries also are building diesels for export. Given those figures, have you been able to convince Congress that you have to have a first rate submarine force to help counter the non-Soviet threat?"
>
> A."In my statement to Congress I tried very strongly to emphasize that we have a multifaceted problem. We have the quality and the number of submarines in the Soviet Navy, no matter how they use them on a day-to-day basis. That capability is there, so I have to have a submarine that can counteract that capability--and also the fact that they have a large number of submarines.
>
> But if, in fact we are not going to war with the Soviet Union, and it certainly looks that way now, there are still the Third World countries

> around the world that are more than willing to carry out terrorist threats or to do various and sundry other things with their submarines. I have to be capable of also trying to counteract that threat. So when I talk to Congress, and when I talk anywhere, I emphasize the range of capabilities the submarine has, not the least of which are surveillance, intelligence, and warning.
>
> When you are out there covertly you can get a lot of intelligence that other people can't get because it would be to obvious. We also have the capability of working with the SEALs(naval special warfare group). We also have the strike capability with the Tomahawk land-attack(cruise) missile. We have a mining capability. We have a range of capabilities that can be used against the submarines of any country in the world, but we have to be fully capable of taking on the threat that the Soviet Union has built with the quality of submarines that they have."[42]

The Admiral talked around the issue. The Soviet Union is still presents a challenge, and that is important but in the context of a regional conflict, the Soviet Union will, in all probability not be involved. The Admiral mentioned our range of capabilities, but what are they? His examples reflect proven, solid abilities but how will they be used against Third World submarines? SEALs and Tomahawk land attack missiles: their submarines better be in port. Mining capabilities: Carrying mines means carrying less torpedoes. The problem is, unfortunately, much more complex. First, the submarine must be found and that is not as easy as "emphasizing a range of capabilities." The Admiral is stuck in a Cold War mentality and simply does not see the Third World submarine as a credible threat.

A recent lecture, given at the Naval War College by a member of the Pentagon planning staff, declared that ASW is

a major portion of our new strategy. Considering the Soviet Union, this would certainly be prudent, but what about the those regional/low intensity conflicts? Some ASW may be required in crisis response, he went on to say.

Our Maritime Strategy is nebulous enough to allow interpretation by the individual. In a free thinking society such as ours, frank and involved discussions usually result in the best solution to a problem. But in this case, the solution (Maritime Strategy) is not sufficiently clear enough to allow our leaders to sing from the same sheet of music. We have seen the outgoing CNO state the correct analysis of the situation (in this writer's opinion), and two other high level Pentagon officials who have missed the mark. The lecturer at the War College does not understand the depth of the problem. Unfortunately, the idea that `some' ASW will be required is absolutely incorrect, and history proves it.

CHAPTER VII

THIRD WORLD SUBMARINE'S EFFECT ON U.S. STRATEGY

In sheer numbers the amount of aircraft and ships required to mount an effective ASW campaign is very large. This number would most probably increase in a regional conflict where a casualty conscious American public could pull its support at any time.

In the Falkland's War, the British had to deploy a

disproportionate amount of effort to counter the Argentine submarine threat. This highly trained ASW force, as stated before expended 200 ASW ordinance devices without effect.[43] Thus a submarine, utilizing technology from the 1960's, was able by its presence alone, to confound and confuse a great power. During the 1973 Queen Elizabeth 2 incident, 100 planes and ships were assigned for protection.[44] For a idea of numbers required, an examination of the British in World War I may be helpful. During this war, Britain used 2932 vessels and aircraft to counter a German submarine force of 178.[45] This is slight greater than a 16 to 1 ratio. Will the United States be willing and/or able to commit these types of numbers to the next conflict? Numbers of ASW assets are important but are not the only consideration.

How will a regional conflict in the vicinity of Japan, the Straits of Gibraltar, or the Straits of Hormuz effect the United States? Merchant crews, vital to world trade, could refuse to sail. The high cost of insuring a merchant ship would entice many owners to avoid the disputed area altogether. During the Iran/Iraq War, rates as high as 15% (of the ships insured value) were levied on those brave enough to enter the Gulf.[46] Because the war did not involve the use of submarines, rates would probably have been even higher because of the axiom "missiles may cripple but torpedoes sink."[47]

A submarine threat will also significantly delay a crisis response time. For our own submarines, traveling at

higher speeds causes a corresponding reduction in threat detection capability. Therefore the speeds of advance would need to be cut drastically to attempt to search and clear an area. Convoys may be used but they take time to assemble, coordinate, and effect. Fast moving surface ships, including some of the newer sealift vessels, may be able to drive past an enemy conventional submarine. But with a detection ability, ranging up to 60-100nm and a submerged top speed of 25 kts, the TR-1700 would be able to obtain a firing position over a much larger area than previous classes of conventional submarines. Keeping the sea lines of communication open could be a difficult task.

Lastly, an early catastrophic loss could adversely affect our own ability to fight the war. Note that the sinking of the Belgrano provided an effective deterrent to the Argentines for the remainder of the war. What would have happened if, during the Desert Shield/Storm operation, a Muslim nation sympathetic to Iraq, had used their submarine force to sink a carrier or a military supply ship?. For a large loss, whether measured in dollars or in human life, the effect on public opinion could severely hamper any further military operations.

ASW is an inherently difficult problem. Conventional submarines are small thus their ability to reflect active sonar is less than their nuclear counterparts. Diesel submarines make little or no noise while submerged. This fact alone severely restricts the ability to detect them by

passive means (the main detection method of our U.S. ASW forces). With a very low indiscretion rate, the probability of detection diminishes. Maritime patrol aircraft are generally credited with finding a snorkeling submarine within 20 minutes.[48] But 20 minutes is pushing the edge of the envelope. The British never found the San Luis though she snorkeled and even surfaced once for repairs.[49] ASW problems increase exponentially when entering shallow water. A large portion of the world's oceans are relatively shallow water. Will the United States commit an expensive SSN to a shallow water campaign where there is the possibility it may be lost?

CHAPTER VIII

CONCLUSION AND RECOMMENDATIONS

The Third World submarine proliferation is a multifaceted problem. A small nation with relatively few submarine assets could undermine our entire objectives in a crisis. How can and should this problem be dealt with? The following avenues should be considered.

First the Maritime Strategy needs to be understood and comprehended in the same way by the leadership in the U.S. Navy. Specific guidance needs to be established that the phenomenon of the these newer diesel-electric submarine is not a dream but a powerful challenge. With marching orders, similar to Admiral Trost's point of view, the ASW forces of

our nation could begin to prepare for the inevitable.

Second, an immediate ban on technological exports should be enacted worldwide. With the coalition war against Iraq only five days old, the United States began proposing stricter curbs on the export of technology. Presently the proposal applies only to chemical, biological, and missile technologies but this could be expanded.[50] The two major Western submarine exporters, Germany and France are already feeling discomfort over the present war with Iraq. Both were responsible for a large part of Saddam Hussein's war machine. French soldiers will die at the hands of this machine and international public opinion against Germany, whose 20th century record is far from clean, will adversely affect their business opportunities. With the war as a backdrop and potential indicator of future uses of high technology by madmen, submarine exports could be stopped.

Third, for those submarines already delivered, export countries could supply our government with whatever operational and acoustic intelligence is available. Much is written about the Soviet's submarines but the same is not true for the rest of the nations of the globe. American ASW commanders must rely, for much of their information, on a book that can be found in any library, Jane's Fighting Ships. Any individual who is involved in submarine detection and classification will state that a positive identification is made by a series of acoustic and other clues. Without the clues, we will be fighting at an incredible disadvantage.

Fourth, the U.S. Navy needs to conduct more exercises with foreign navies, especially those with a modern submarine force. Their is no substitute for experience. In 1989, the U.S. Navy conducted 121 combined exercises with allied and foreign navies.[51] While impressive, this figure does not include a significant amount of submarine activity.

Fifth, shallow water ASW needs further emphasis. Despite the abilities of the new open ocean conventional submarines, shallow water areas present compounded problems. Adverse and probably, for U.S. forces, unfamiliar acoustic conditions will be a feature of these areas. Detection ranges will be severely restricted due to a variety of factors. If we decide to use our own submarines in an area such as this, navigation presents its own problems. Some areas of the world are still not well charted. In other areas swift under currents could quickly place a slow moving submarine in jeopardy.

As presented, the Third World submarine threat is real and will only get worse as more and more nations acquire them. Today's friend may be tomorrow's enemy. While the Soviet Union, alone, presents the greatest threat to our existence as a nation, the probability that regional and low intensity conflicts will embroil us is much higher. The United States needs to vigorously prepare for this eventuality. The Maritime Strategy needs to be understood by our leaders in the context presented by Admiral Trost. Third World capabilities are there, and we must be ready.

APPENDIX I

CONVENTIONAL SUBMARINE FLEETS AS OF 1990[52]

NAVY	No. in Service	Type	Country of Design	Country of Construction	Comments
Albania	2	Whiskey	USSR	USSR	
Algeria	2	Romeo	USSR	USSR	
	2	Kilo	USSR	USSR	
Argentina	2	Type 209	FRG	FRG	One is the San Luis
	2	TR-1700	FRG	FRG-2 (ARG-2)	Argentina wants to sell TR1700s
Australia	6	Oberon	UK	UK	All have been modernized
	(6)	Type 471	Sweden	Australia	6 ordered, 2 on option
Brazil	(1)	NAC-1	Brazil	Brazil	2,200 ton boat of Brazilian design
	1	Type 209	FRG	FRG-1 (Brazil-3)	
	3	Oberon	UK	UK	
	2	GuppyIII	USA	USA	All served in USN 1946-1973
	2	GuppyII	USA	USA	Not of any military value
Bulgaria	4	Romeo	USSR	USSR	All served with the Soviet Navy
Canada	3	Oberon	UK	UK	All modernized
Chile	2	Type1300	FRG	FRG	
China	3	Ming	PRC	PRC	Based on Soviet Romeo design
	91	Romeo	USSR	PRC	PRC production of popular Soviet design
	15	Whiskey	USSR	USSR-6 PRC-15	Some have been placed in reserve
Colombia	2	Type 209	FRG	FRG	
Cuba	3	Foxtrot	USSR	USSR	
Denmark	3	Kobben	FRG	FRG	Purchased from Norway, being updated
	2	Type 205	FRG	Denmark	
Ecuador	2	Type 209	FRG	FRG	Both recently updated
Egypt	8	Romeo	USSR	USSR-4 PRC-4	PRC delivered these boats in mid 1980's
France	4	Agosta	France	France	
	9	Daphne	France	France	Modernized in late 1970's

APPENDIX I (Cont.)

CONVENTIONAL SUBMARINE FLEETS AS OF 1990[82]

NAVY	No. in Service	Type	Country of Design	Country of Construction	Comments
Germany	(18)	Type 211	FRG	FRG	Will replace the Type 205 and some 206's
	18	Type 206	FRG	FRG	
	6	Type 205	FRG	FRG	Hull U1 is the trials boat for the fuel cell system
Greece	8	Type 209	FRG	FRG	
	1	GuppyIIA	USA	USA	Obsolete
	1	GuppyIII	USA	USA	Obsolete
Holland	4	Walrus	HOL	HOL	
	2	Zwaardvis	HOL	HOL	Based on US Barbel hull design
	3	Dolfijn/ Potvis	HOL	HOL	Due to be Decommissioned
India	2	Type1500	FRG	FRG	
	(1)	Type1500	FRG	India	Was to have been class of eight
	3(+?)	Kilo	USSR	USSR	India is supposedly buying these Kilo's instead of more Type 1500s
Indonesia	2	Type 209	FRG	FRG	
Iran					Plans for submarine branch
Israel	(3)	Type ?	FRG	(FRG-1) (Israel-2)	Funded by USA but order has not been confirmed
	3	Type 206	FRG	UK	Built by Vickers
Italy	2	Pelosi	Italy	Italy	Improved Sauro class
	4	Sauro	Italy	Italy	
	4	Toti	Italy	Italy	
Japan	(2)	2400ton	Japan	Japan	Improved Yuushio class
	11	Yuushio	Japan	Japan	
	6	Uzushio	Japan	Japan	
Korea,No.	16	Romeo	USSR	PRC-7 No.Korea-9	Obsolete
	4	Whiskey	USSR	USSR	Obsolete
Korea,So.	3	KSS-1			Has only small submarines, but has plans for submarine branch
Libya	6	Foxtrot	USSR	USSR	
Malaysia					Plans for submarine branch

APPENDIX I (Cont.)

CONVENTIONAL SUBMARINE FLEETS AS OF 1990[52]

NAVY	No. in Service	Type	Country of Design	Country of Construction	Comments
Nigeria					Plans for submarine branch
Norway	1(5+)	Type 210	FRG	FRG	
	11	Type 207	FRG	FRG	2 are being decommissioned, 6 are being modernized, and 3 will be given to Denmark
Pakistan	2	Agosta	France	France	Original ordered by South Africa
	4	Daphne	France	France	1 bought from Portugal
Peru	6	Type 209	FRG	FRG	
	4	DosdeMayo	USA	USA	2 carry deck guns (127mm), the last of any navy to do so
	2	GuppyIA	USA	USA	Obsolete
Poland	4	Kilo	USSR	USSR	
Portugal	3	Daphne	France	France	Fourth was sold to Pakistan
Rumania	1(+?)	Kilo	USSR	USSR	
Saudi Arabia					Plans for 6-8 submarines
So. Africa	3	Daphne	France	France	Modernized in mid 1980's
Spain	4	Agosta	France	Spain	
	4	Daphne	France	Spain	Being modernized
Sweden	(5)	Type A-19	Sweden	Sweden	Will incorporate AIP technology
	4	Type A-17	Sweden	Sweden	
	3	Type A-14	Sweden	Sweden	1 was test platform for AIP system
	5	Type A-11	Sweden	Sweden	Partial modernization in progress
Syria	3	Romeo	USSR	USSR	
Taiwan	2	Hai Lung	HOL	HOL	Modified Dutch Zwaardvis class
	2	GuppyII	USA	USA	Obsolete
Turkey	7(2)	Type 209	FRG	FRG-3 Turkey-6	Nos. 10-12 cancelled in favor of larger design
	2	Tang	USA	USA	Obsolete
	2	GuppyIII	USA	USA	Obsolete
	5	GuppyIIA	USA	USA	Obsolete

APPENDIX I (Cont.)

CONVENTIONAL SUBMARINE FLEETS AS OF 1990[52]

NAVY	No. in Service	Type	Country of Design	Country of Construction	Comments
UK	1(3)	Upholder	UK	UK	Later boats may be larger
	11	Oberon	UK	UK	9 being refurbished
USSR	1	Beluga	USSR	USSR	Experimental
	14(+?)	Kilo	USSR	USSR	
	22	Tango	USSR	USSR	Never exported
	45	Foxtrot	USSR	USSR	Obsolete
	48	Whiskey	USSR	USSR	Some 236 built
USA	0				
Venezuela	2	Type 209	FRG	FRG	

Notes: 1) Sources differ on the exact numbers and types of submarines in each nation's inventory. The above table should not be used as an authoritarian guide.
2) Numbers in parenthesis are boats that are being built/on order.
3) Numerous small submarines (i.e. midget) exist throughout the world. Only South Korea's was listed to give a comparison to North Korea's submarine force.

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